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(54) Abstract Title

**Hand held electronic device with back entry touch pad**

(57) A hand held electronic device such as a Personal Digital Assistant (PDA) 1 comprises a casing with a thin screen (e.g. LCD) display 2 on the front side, and a touch screen or pad (4, Fig. 2), separate from and parallel to the display screen 2, on the rear side of the device. A cursor C on the display screen 2 follows movements of the operative finger (or stylus) of the user as it moves over the touch pad, so that the cursor can be positioned over displayed application icons. An increase in pressure from the finger can be used to select the application or, alternatively, a button 5 can be used to confirm that an entry or selection has been made. The display screen and touch pad may be rendered sufficiently transparent so that the operator's finger can be seen from the display screen side of the device, instead of using a cursor. The device can be mounted on a watch.

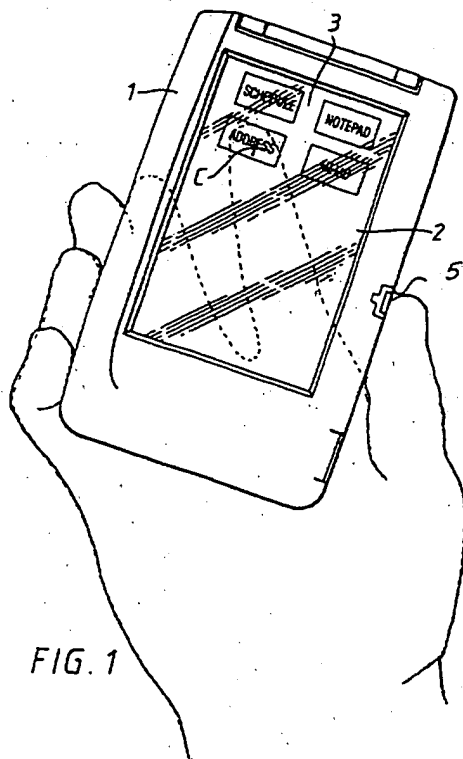


FIG. 1

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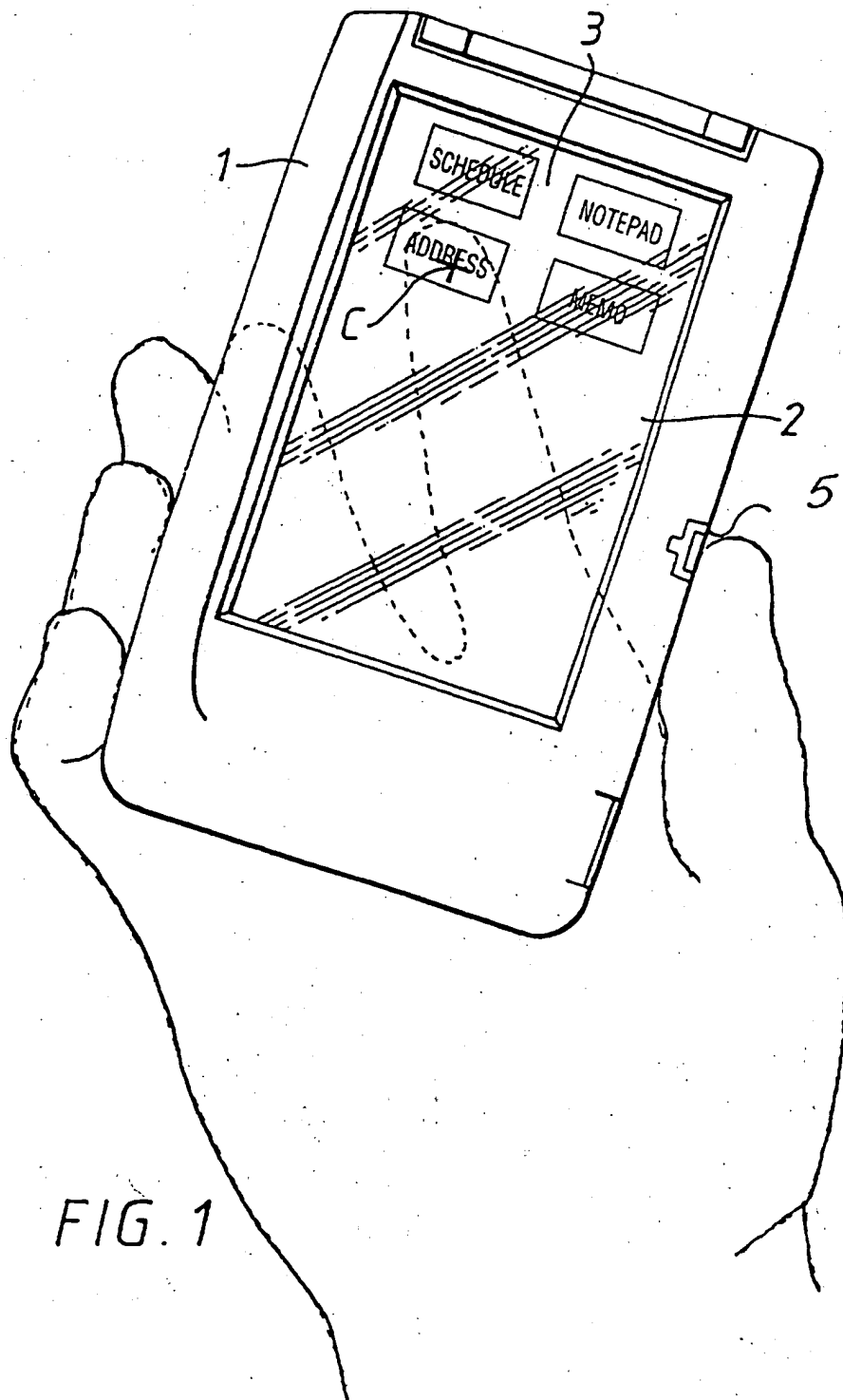


FIG. 2

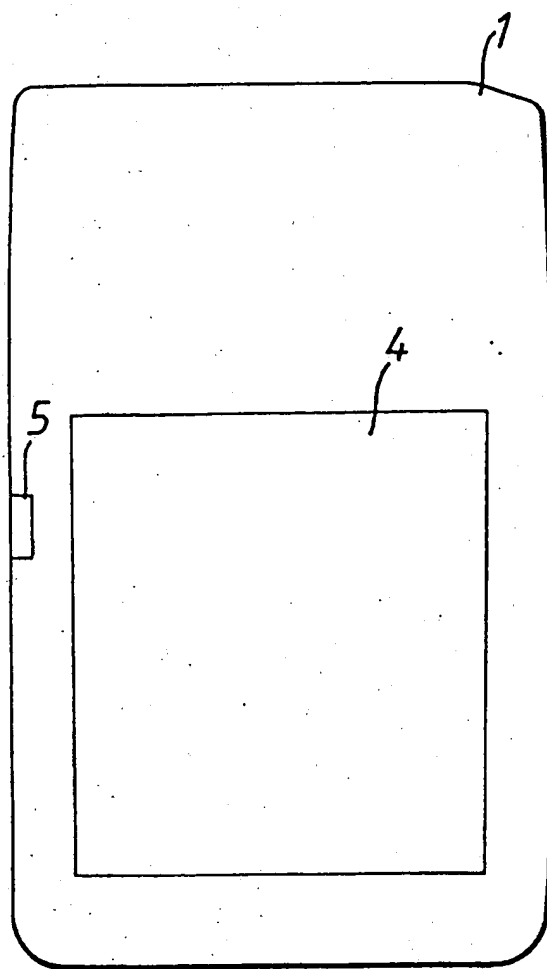
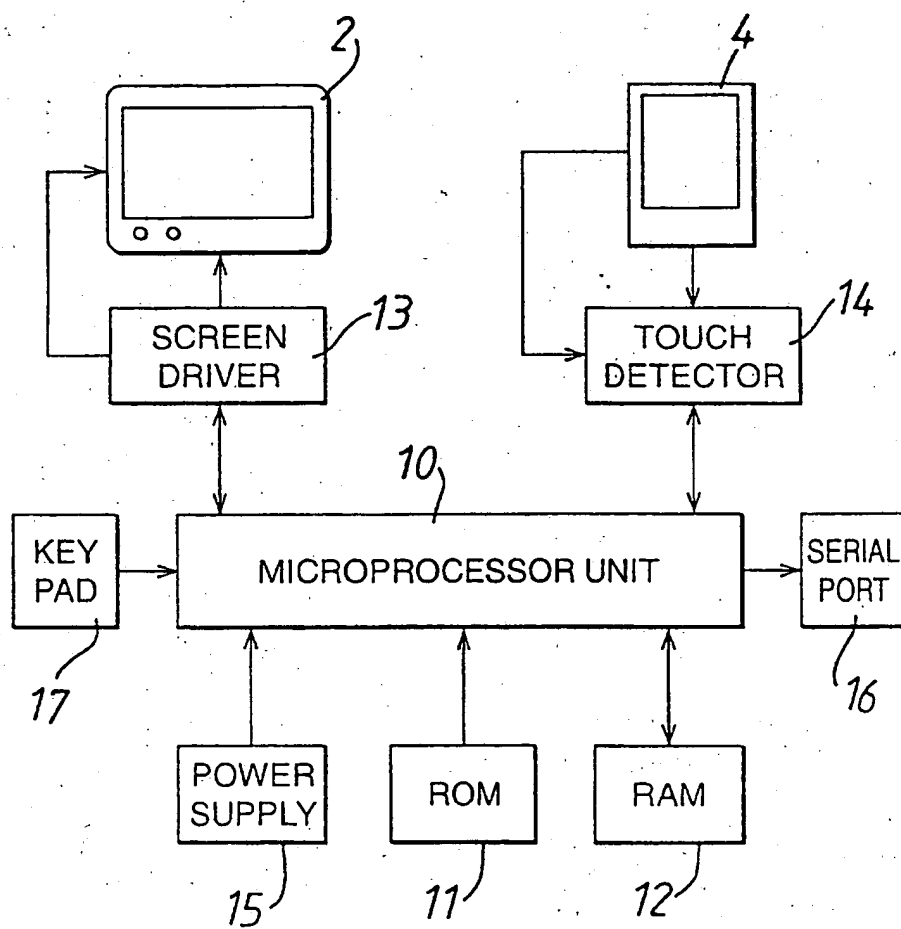


FIG. 3



## A BACK ENTRY TOUCH PAD

The present invention concerns hand held digital processors, digital watches, and other portable devices that need the user to enter data.

5        There are a wide and increasing variety of such devices on the market. In particular many such devices have been given the generic title PDA (Personal Digital Assistant).

10        These devices are steadily being made smaller and smaller. A major problem which arises with each successive reduction in size is to select a mechanism that can be used to input data and/or commands into the device and yet which takes up the minimum of space. Once the devices have reached pocket notebook size it is  
15        frequently impracticable to have even a cut down Qwerty-type keyboard. Thus many such devices now have touch screens and are designed so that they can recognise a range of alpha-numeric and symbolic inputs via the touch screen.

20        Touch screens have a number of disadvantages. One of these is that as screen size reduces a user's finger is liable to cover more and more of the useful space of the screen. Additionally finger prints can make the screen dirty. A common solution to this particular  
25        problem is to select on or input via the screen using a narrow stylus. The present invention is concerned with providing a novel configuration which reduces the

problems hitherto associated with small touch screens.

In accordance with the present invention there is provided a hand held electronic device having on one side thereof a display screen and on the other side thereof a touch screen whereby data can be entered into the device and the operation of the display screen controlled.

In order that the present invention may be more readily understood an embodiment thereof will now be described by way of example and with reference to the accompanying drawings in which:

Figure 1 is a plan view of a hand held PDA incorporating the present invention;

Figure 2 is a rear view of the PDA of Figure 1; and

Figure 3 is a circuit diagram showing the main components of the device of Figures 1 and 2.

Referring now to Figure 1 this shows a PDA held by a user. The scale of the device is immediately apparent by its relationship to the user's hand. The device consists of a casing carrying on one side thereof a main screen 2 which in many typical devices will be an LCD display although any suitable form of thin screen display can be used.

As shown in Figure 1 the screen 2 is displaying a series of potential applications which can be carried out by the device when acting as a PDA. Naturally these applications are neither exhaustive nor limiting to the

inventive concept. In a conventional device it is likely that the screen 1 would be a touch screen and that a user would select applications and input data either using a finger or a stylus. Selection of a desired application is made by using active areas which are located at 3. The applications shown consist respectively of address storage, memo storage or display, a spreadsheet, a scheduling notepad, a diary, and a calculator. Naturally this list can be either expanded by the addition of other applications or reduced.

However in the embodiment described screen 2 is not a touch screen.

Referring now to the rear view of the device as shown in Figure 2 it will be seen that the back panel of the casing of device 1 includes a touch screen or pad 4 separate from and parallel to the display screen 2. As can be seen from Figure 2 this pad 4 is not a one to one match in size to screen 2 though of course it could be.

In operation of the device shown in the accompanying drawings it will be appreciated that the touch pad 4 can provide a number of different functions.

Firstly when the device is switched on and the display shown in Figure 1 is visible the device can be arranged to display a cursor C on the display screen 2 which will follow movements of the operative finger of the user indicated by the dotted outline as it moves over the touch pad 4 on the other side of the device so that

the cursor can be positioned over one of the application icons displayed in section 3 of the display screen. Naturally there can be a preset mapping between movements detected by the touch pad and the effect of these detected movements as displayed on the display screen 2. When the cursor has been positioned in this manner an increase in pressure from the finger of the operator can be used to select the application. It is of course also possible to provide a button, for example at 5, also shown on Figure 1, which can be used as a confirmation that an entry or selection is to be made rather than using increased finger pressure on touch pad 4. However, the first instinct of most users is to tap the touch screen as they might tap a mouse button. It would of course be possible for a user to activate the touch pad with a stylus but this would normally have the disadvantage of requiring the user to hold the device in the other hand.

If the selection of an application generates a menu or a list then once again selection can be made in a similar manner by controlling a cursor display using finger movement over the touch pad.

In a variant of the above embodiment it is possible to render the front screen of the device 1 and the touch pad 4 sufficiently transparent so that the finger of an operator can actually be seen from the display screen side of the device. By this means it may not be



necessary for the microprocessor within the device to generate signals for displaying and moving a visible cursor on screen 2.

In another variant where the touch pad is mounted on the back of a watch, data entry can be enabled by sensors on the watch strap when the watch is taken off the wrist, or when the strap expands when the finger is pushed behind it. For a hand-held device as shown in Figure 1, the pressure of the other fingers may be used to trigger data entry.

It will be appreciated that as already mentioned many current PDA's have the facility of enabling a user to enter symbolic commands and alpha numeric characters via the front mounted touch pad. The device being described has the same facility with the added advantage that the area of the touch pad which can be used for inputting the symbol, whether it be a gesture or an alpha numeric character, can be considerably increased with respect to the area on the actual display into which the symbol is to be entered.

Referring now to Figure 3 of the accompanying drawings this shows as a circuit diagram the various components of the device shown in Figures 1 and 2.

As shown in Figure 3 the device 1 comprises a suitable microprocessor 10 connected via appropriate buses to a ROM 11 storing application programs and a RAM 12 for storing transient data. Also connected to the

microprocessor 10 is a screen driver circuit 13 for driving the display screen 2 and a circuit 14 for detecting voltages induced or generated by the movement of the finger of an operator over the touch pad 4 so as to supply appropriate data to be microprocessor 10 so that data can be stored in RAM 12 or appropriate changes made to the display on screen 2. Power for the various circuits shown in this figure are provided by a power source 15 which can be a standard battery power source.

10 The device also includes a port 16 by means of which data can be down loaded from another processor such as a personal computer into the device or by means of which data can be transferred from the device into either a suitable storage device or into another processor. Such

15 a port can be for an infra-red or similar non-physical link or a serial port.

Finally Figure 3 shows a key pad 17. This can merely be an on/off switch or a safeguard against accidental data entry but could be used for other

20 functions.

CLAIMS

1. A hand held electronic device having on one side thereof a display screen and on the other side thereof a touch pad whereby data can be entered into the device and the operation of the display screen controlled.
2. A device according to claim 1 comprising a microprocessor responsive to the detection of movement of an object, which may be a finger or a stylus, over the touch screen to cause a drive circuit for the display screen to display a cursor which moves in response to the detected movements.
3. A device according to claim 1 wherein the display screen and the touch pad are sufficiently transparent to enable the finger of an operator to be viewed from the display screen side of the device.
4. A device according to claim 2 or claim 3 wherein when either the cursor or the finger of an operator is located at an active section increased pressure of the finger causes the entry of data.